

A Web Site for NCEP's Global Ocean Data Assimilation System for Global Ocean Monitoring, Ocean Monitoring Products, and Data Validation

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Project Summary:

The purpose of this project is to maintain and develop a comprehensive web site for global ocean monitoring based on the Global Ocean Data Assimilation System (GODAS) at the National Centers for Environmental Prediction (NCEP). The first objective of the web site is to provide the user community an easy access to the GODAS data sets, comparison of analysis with observations, and various maps of climatology and anomalies of oceanic fields in the past two decades; the second objective is to deliver real time global oceanic monitoring products derived from the GODAS analysis.

The current version of the GODAS was developed by the Environmental Modeling Center of NCEP for initialization of the oceanic component of the NCEP's Climate Forecast System. A retrospective ocean analysis for 1979-present has been produced, and the monthly and pentad (5 day mean) fields are made available for dissemination to the general public through the GODAS web site supported by this project. The Climate Prediction Center (CPC) of NCEP is charged by NOAA's Office of Climate Observations (OCO) to maintain and develop the website, and CPC acts as the NCEP point of contact for the GODAS user community. With the support provided by the OCO, the GODAS web site underwent a significant expansion in FY07 and started an operational product referred to as "Monthly Ocean Briefing" providing a real time assessment of the state of the global ocean and its interactions with atmosphere.

CPC strives to continuously improve the GODAS web site and "Monthly Ocean Briefing" by engaging participations and contributions from both research and operational communities.

Background:

The in situ ocean observation network managed by the NOAA's OCO has greatly enhanced our knowledge of the state of the global ocean and is critical for the ocean reanalysis efforts in the past decade. The National Centers for Environmental Prediction (NCEP) is the operational agency responsible for producing ocean analysis for the Global Ocean by assimilating in situ observations into an oceanic general circulation model forced by atmospheric fluxes. Currently, assimilated observations include temperature profiles from XBT, profiling floats and TAO moorings. The Global Ocean analysis is used to initialize the oceanic component of the NCEP's Climate Forecast System (CFS) (Saha et al. 2007) and was developed in 2003 (Behringer and Xue 2004). The retrospective global ocean reanalysis for 1979-2004, and its real time updates, constitute a unique dataset that can be used to diagnose the past oceanic variability and to monitor the recent trend and current oceanic conditions in support of climate attribution and prediction activity.

To gain a broader dissemination of GODAS data products, and to increase research community's involvement in the assessment of GODAS towards increasing the

effectiveness of the NOAA's ocean observing systems, the NOAA's OCO currently supports the Climate Prediction Center of NCEP to maintain a comprehensive web site for the GODAS. The web site contains data link, data validation, and oceanic monitoring products. Since the web site aims to serve a broad user community that includes operational forecast centers, scientific research groups, and the general public, CPC solicits feedbacks from all users, answer their questions in a timely manner, and improve the web site according to the needs of user community.

Website: <http://www.cpc.ncep.noaa.gov/products/GODAS/>

Partnership:

This project has been coordinated with the production of the GODAS data set by the Environmental Modeling Center of NCEP. CPC also works with various expert teams supported by the OCO to validate, and to enhance, the GODAS products with in situ observations.

Accomplishments:

1. GODAS web statistics

The GODAS web site has been significantly improved in FY06. One of the major improvements is a revised home page that contains animations and plots that describe the recent conditions of the state of the ocean (Fig. 1). The GODAS home page contains cursor activated animations of the pentad means for the past three months and plots of the monthly means for the past 30 days for selected variables such as SST, heat content and Tropical Cyclone Heat Potential. The modified home page is particularly useful for monitoring the recent trends and current conditions of the ocean. The monthly hits to the GODAS web increased five fold from June 2006 to July 2006 due to the improvement in the home page. Another significant increase in the number of the monthly hits to the GODAS web site happened in May 2007 when CPC introduced an operational oceanic monitoring product, referred to as "Monthly Ocean Briefing" (Fig. 1). Details about the new product are described in the next section.

2. Monthly Ocean Briefing

The GODAS home page contains many plots and animations that are useful for forecasters and researchers to assess the current oceanic conditions and infer their impacts on the atmosphere. However, community can be better served by providing a synthesis of plethora of such products and by summarizing (a) how the state of the ocean evolved recently, (b) what is interaction with the atmosphere, and (c) how it will likely evolve in near future. Since CPC have access to the real time oceanic and atmospheric reanalysis data and the climate outlooks made by the NCEP's CFS, CPC is well positioned to provide the user community with a real time assessment of the state of the global ocean, its interaction with the atmosphere, and an assessment of how model predictions verify. To accomplish this, an operational oceanic monitoring product referred to as "Monthly Ocean Briefing" was initiated in May 2007 at the CPC. The "Monthly Ocean Briefing" is conducted with a PowerPoint Presentation using a conference call, and is held around the 7th day of each month. The schedule of the ocean

briefing is sent by email to a distribution list that contains both internal and external colleagues. The conference call is open to anyone who is interested in the briefing. During the past 7 months, the ocean briefing has been well received by internal and external participants, and feedback received so far indicates that the ocean briefing is very informative and useful, and further, is becoming a valuable tool for both research and operational community. The past PPT presentations have been archived and made available to the general public at the GODAS web site.

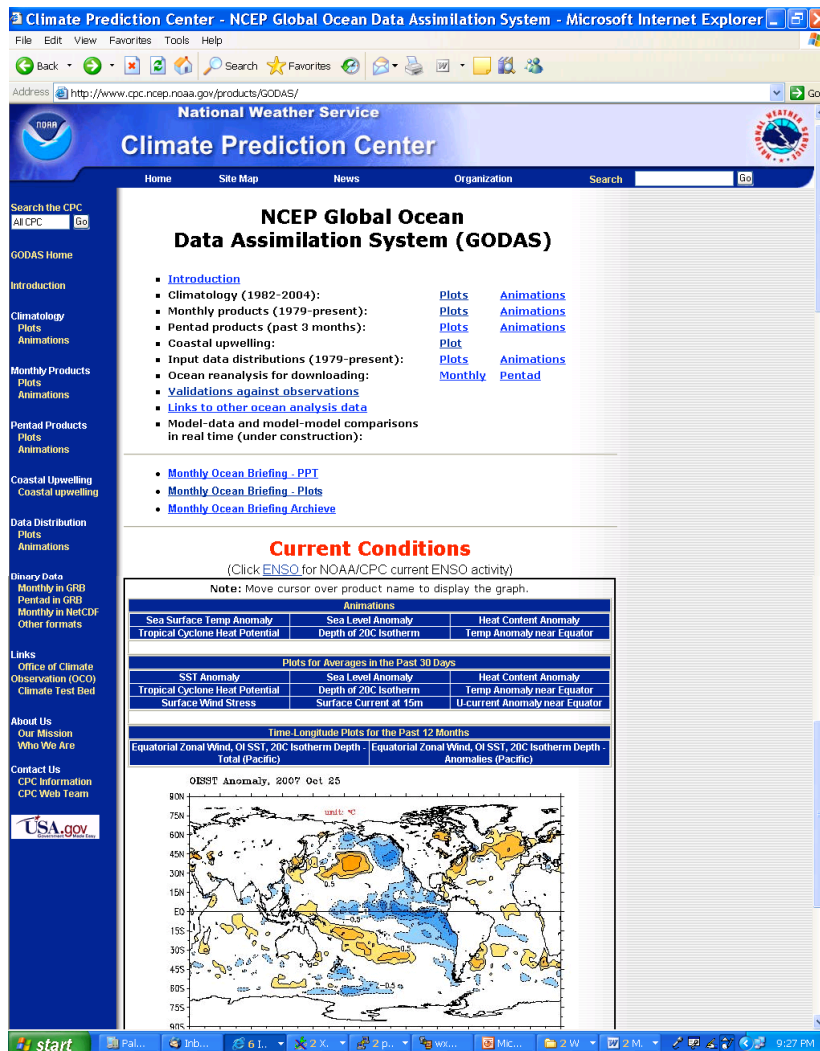


Fig. 1 The home page of the GODAS web site.

Through the interaction with the user community, the content of the PPT presentation has improved with time, and it has been structured to contain a set of fixed monitoring products and additional analyses that are used to address some oceanic events of current interest. Contributions from external community are highly encouraged. The NOAA's Pacific Marine Environmental Laboratory has been contributing to the ocean briefing a

few slides on the SST heat budget analysis, Warm Water Volume and depth-longitude section of temperature for the tropical Pacific.

3. Uncertainties in NCEP fluxes

The CLIVAR's Global Synthesis and Observations Panel organized the Second CLIVAR/GODAE Meeting on Ocean Synthesis Evaluation at MIT on September 24-25. CPC was invited to give a presentation on "Uncertainties in NCEP Fluxes". In response to this invitation, we systematically evaluated the biases of fluxes in NCEP's CDAS, CDAS2 and GDAS. The momentum flux was validated against the FSU in situ objective pseudo wind stress and FSU QuickScat winds; the heat flux was against the blended flux product (OAflux) from WHOI, the in situ objective flux product from FSU and the ISCCP radiation flux. The study suggests that the momentum flux from CDAS and CDAS2 have large errors in the far eastern tropical Pacific and the tropical Atlantic. The momentum flux of GDAS agrees with observations much better since it is an operational atmospheric analysis that uses a much improved version of the atmospheric model and assimilates the QuickScat winds. The heat fluxes of CDAS are slightly more accurate than those of CDAS2. Both CDAS and CDAS2 have too little short wave (SW) radiations, resulting in net heat flux biases as large as -60W/m^2 . The variability of SW is poorly simulated by both CDAS and CDAS2. The CDAS2 has too large net heat flux variability due to too large latent heat (LH) flux variability. However, the correlation of the LH of CDAS and CDAS2 with OAflux is above 0.6 over the global ocean. Based on the comparison results, we decided to use the CDAS heat flux in our "Monthly Ocean Briefing" to assess the attributions of SST changes in the global ocean. It turned out that the CDAS heat flux product provides very useful information on the SST variability in the extra-tropics where oceanic latent heat fluxes are the major forcings for SST.

4. Impacts of Argo salinity in NCEP GODAS

Several experimental runs have been made to assess the impacts of Argo salinity in the NCEP GODAS. It was found that the ocean currents in the tropical Pacific significantly improved due to corrections of the model density field made by Argo salinity (Behringer 2007). The impacts of Argo salinity in the tropical Indian are also examined, and the results have been described in a journal paper accepted by Journal of Geophysical Research (Huang et al. 2007).

References:

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